# Progress Report
**03 November 2000**

**FHWA POOLED-FUND PROJECT NUMBER:** SPR 2(219)

**TITLE:** Extending the Season for Concrete Construction and Repair

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**OBJECTIVE:** To develop an antifreeze admixture conforming to existing industry standards. This work will adapt recently developed knowledge about off-the-shelf admixtures to the specific conditions of highway construction. The admixture will protect concrete to 23°F without detrimental effects on short- and long-term strength and freeze-thaw durability.

**PROGRESS:** 01 Oct ’00 through 01 Nov ’00:

*Problem with the SPR number:* The FHWA initially established this project as SPR 2(214) but discovered in October, when states where having difficulty in obligating their funds, that 2 projects were mistakenly assigned the same number. States that have joined this project thus far were notified by CRREL via e-mail on 25 Oct ’00 to de-obligate their funds and to re-obligate them to SPR 2(219). If you are still having problems please let me know.

*Goals:* The following is a short outline of this project extracted from the full proposal dated 13 June 2000. Our first goal is to define in the laboratory a preliminary combination of off-the-shelf admixtures that will not affect the workability or the durability of concrete and that will accelerate cement hydration and promote appreciable strength gain at below-freezing temperatures. Once this is done, full-scale field-testing is planned for this winter (2000-01) to assure that the preliminary admixture formulations work under actual construction conditions in cold outdoor weather.

Optimization, proof of concept, and field demonstrations, hosted by various states, are planned for year two. The reporting and transferring of this new cold-weather technology to the DOT partners along the answering any loose ends from years one and two will happen in the final year of this project.

*Accomplishments:* Despite the glitch with project numbers, work began during the second week of October. We received 9 different commercial admixtures from each of two companies (Master Builders and W R Grace) to support the laboratory portions of this study. Work is well underway to develop control mortar mixtures at various w/c ratios to provide the medium for screen testing the received admixtures. We are on a schedule to give us our first concrete mixture complete with a first-cut low-temperature admixture around Christmas.

**LOOKING AHEAD:** To scale-up the mortar mixtures to concrete we need each state to send us typical concrete mix designs as shown in the table below. This project targets portland cement mixes, but other designs that use fly ash, blast furnace slag, or silica fume are welcome and will be evaluated as time permits. We need mixes that span low to high w/c ratios (say 0.30 to 0.50) so that we can develop guidance that will be useful to each of our partners. Our plan is to use our local mix designs that use similar cement factors and w/c ratios to those used by DOTs to do the year one and year two field validations. The demonstration portion, of course, will be conducted on one or more of the mix designs that you submit to us.

| **Example Concrete Mix Designs** | | | |
|---|---|---|---|
| | 3000 psi | 4000 psi | 3500 psi |
| Cement, Type I | 611 | 705 | 428 |
| GGBFS | | | 183 |
| #8-3/8 | | 1409 | |
| #8-3/4 | | | 888 |
| 3/8-3/4 | 1800 | | 888 |
| Sand | 1200 | 1409 | 1313 |
| Water | 283 | 285 | 249 |
| Admixtures | | HRWR | Water Reducer |
| Slump | 2-4” | 5-7” | 1 ½” |
| Air content | 4-7% | 5-8% | 6% |
| w/cm | 0.46 | 0.41 | 0.41 |

**WHAT WE NEED FROM YOU:**

1. Please send your mix designs to us before Thanksgiving, if possible.
2. Let us know if you are having problems obligating funds to SPR 2(219).
3. Start thinking about the field demo in year 2. WI has tentatively offered a site in one of their northern districts and we need a few more to choose from. Your obligation in this portion is to obtain permissions to perform the particular field investigation, to co-ordinate with appropriate authorities, and assume the cost of construction. CRREL will instrument the site and monitor and report on the work.
4. Send us the e-mail addresses of others that should be on this mailing. Also, let us know if you do not want to receive future messages.